(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 522 326 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **92110197.8**

(22) Date of filing: **17.06.92**

(51) Int. Cl.[5]: **B65D 13/00**, B65D 21/02, B65D 51/20, B31B 17/00

(30) Priority: **27.06.91 IT MI911770**

(43) Date of publication of application: **13.01.93 Bulletin 93/02**

(84) Designated Contracting States: **AT BE CH DE ES FR GB LI NL SE**

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(54) A flexible material container and related production method.

(57) A container made of flexible material (2) with the consistency of a rigid container, suitable for vacuum-packed or non vacuum-packed products and/or sterilizable products, or for containing liquid products, comprising stiffening plates as a cover (3) and as a base (4) and a system of folds which involves a horizontal folding edge (22) and the two opposed vertical folding edges (23). In a first embodiment, the cover plate (3) has a lid (6), for example opening on a hinge, and the base plate (4) contains an expansion chamber (21), which communicates with the outside in order to compensate for any possible variation in the volume of the product inside the container (1), at the moment of packing. In another embodiment of the container (1), the cover plate (3) is provided with a dispenser spout (25), and the base plate is joined to the plate (3), in such a way as to allow the containers (1) to be stacked on top of each other, irreversible hooking means (29, 30) being foreseen inside the said plates (3, 4), which hold the plates together after the axial crushing of the empty container.

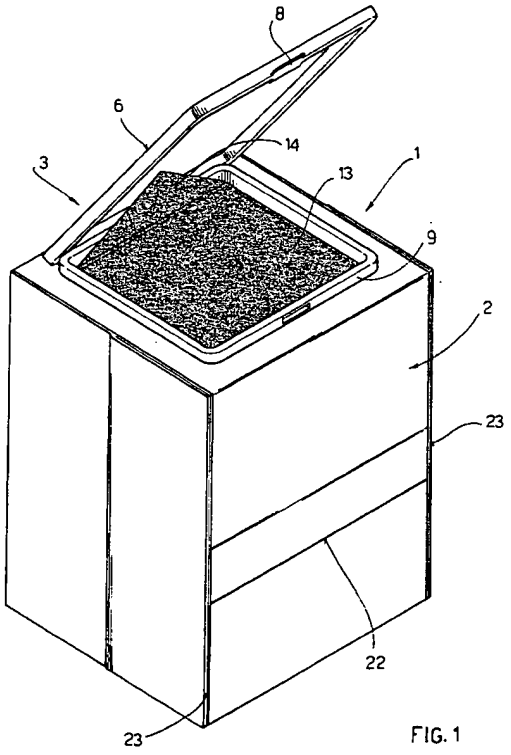

FIG. 1

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The object of the present invention is a container made of flexible material, with the consistency of a rigid container, and a method of production thereof.

The container according to the invention, in its different embodiments, is particularly suitable for vacuum-packet or non vacuum-packet powder products, and also for containing liquid or powdery products and for sterilizable products.

Various types of containers are in existence on the market.

For example, flexible containers are used for conserving products in powder form, such as coffee, under vacuum; these containers do not keep their shape after opening (they collapse), with the obvious drawbacks this entails, or rigid metallic containers are used (for example tins) which, however, tend to be expensive and retain their original bulk after use.

The latter type of container is widely used also for liquids and sterilizable products.

Semi-rigid cardboard containers are also in use for liquid products, such as fruit juices and the like, usually having a layer of aluminium interposed and an inner plastic film. These containers have a cost midway between the ones previously described, and although they are sufficiently rigid, they cannot be completely recycled becaused of the non-homogeneous nature of the materials making up the various layers, which is a problem also found usually with the flexible containers first described.

A semi-rigid container of the type just mentioned is described, for example, in CH-A-385 100, which comprises a bottom lid, a top lid and a skirt presenting an external layer made of cardboard material and an inner layer made of polyethylene. The jointing of the skirt takes place along a vertical strip, by overlapping its two adjacent edges after having removed a cardboard strip on the internal edge, and by heat welding the polyethylene sheets which come in contact. The jointing between the edges and the lids, which are made of plastic material, takes place by inserting the skirt edges into corresponding external peripherical foldings of the lids and by effecting a welding.

The aim of the present invention is to eliminate the above drawbacks, by providing a container suitable for all the uses quoted, which is economical, of low weight, able to be reduced to a small volume after use, possibly recyclable, and very practical both during storage and use.

The aim is obtained by means of the features listed in the attached claim 1.

The container according to the invention is made of flexible material with a one-layer or two -layer film, which is appropriately folded, and has respective plates, preferably in plastic material, at its lower face and its upper face, in such a way that it is substantially rigid.

The container's rigidity is given by the said base and upper or cover plates, which are appropriately heat-welded to the flexible material, and by the folding system adopted, which determines a horizontal folding edge and two horizontal or vertical folding edges on two opposite side walls of the container, which may possibly be folded back onto the walls adjacent to the same.

In order to increase the rigidity of the container, a preliminary crease may be provided at its vertical edges, or at any rate heat deformation may be foreseen to produce ribs on the vertical walls.

The container according to the invention can be made equally well of a single material, or of a double-walled material, according to need.

An embodiment of the container according to the invention, particularly suitable for vacuum-packing or sterilizing the products contained, has its upper plate comprising a lid, opening with a hinge for example, which frees a large opening underneath, which can be appropriately sealed with a peel-off film. The base plate, on the other hand, can be provided with a volume compensator for eliminating any unfilled spaces inside the container, at the end of the vacuum or sterilization cycle. Such volume compensator consists particularly of an impermeable flexible laminate diaphragm, positioned inside the base, with a communication hole to the outside, to allow the diaphragm to expand, and consequently any empty spaces in the container to be filled.

In another embodiment of the container according to the invention, particularly suitable for containing liquid or powdery substances, not vacuum-packed, the said upper plate is provided with a dispenser spout, having for example, a screw plug, and the base plate is shaped in such a way as to be able to fit onto the upper plate provided with the spout. This allows several containers to be piled on top of each other, and also an empty container to be crushed completely until the two plates are brought on top of each other. For this purpose, such plates can be provided inside with irreversible engaging means which prevent them coming apart, keeping the empty container in its bulky condition.

The container can also be made of flexible material which is heat-weldable (heat-sealable) on both sides, so that the base plate and the upper plate can be heat-welded on either the inner or the outer side of such material.

The two "triangles" which are formed at each of the said folds placed on the side walls of the containers can be turned towards the outside, and then heat-welded (heat-sealed).

The production method for producing a flexible material container, according to the invention sub-

stantially consists in intermittently advancing such one-layer or multi-layer sheet material; punching, in predetermined zones, areas where the upper or cover plates must be inserted and, if necessary, areas where the lower or base plates must be inserted; inserting the respective plates in the said areas and welding their edges hermetically; carrying out possible creases by means of a hot plate at predetermined points; feeding the sheet material prepared in this way to a spindle, having a rectangular section, where it is first effected a longitudinal welding and then a transverse welding with following cutting so as to obtain a parallelepiped open on one side, which corresponds to the container according to the invention lying on one side, which is then filled and welded on the open side, after which the two transverse welding edges are folded back and glued with adhesive.

Further characteristics of the invention will be understood more easily from the detailed description below, which refers to one of its purely exemplary and therefore not restrictive embodiments, illustrated in the appended drawings, in which:

Figure 1
is a diagrammatic axonometric view of a container in flexible material according to the invention, in a first embodiment, having a hinged lid, shown in a partially open position;

Figure 2
is a partial diagrammatic bottom view of the container in figure 1;

Figures 3A, 3B and 3C
are diagrammatic views of the upper left-hand part of the container in figure 1, with the folding edge placed on the corresponding side wall extended and then partially unfolded, to show the type of fold;

Figure 4
is a diagrammatic view of the container in figure 1 with the lid in the close position;

Figure 5
is a diagrammatic section taken along the line A-A in figure 4;

Figure 6
is a diagrammatic section taken along the line B-B in figure 4;

Figure 7
is a top plan view of the lid of the container in figure 1;

Figure 8
is a section taken along the line C-C in figure 7;

Figure 9
is a bottom plan view stiffening base, with a volume compensator, of the container in figure 1;

Figure 10
is a section taken along the line D-D in figure 9;

Figure 11
is a vertical section of the container in figure 1;

Figure 12
is a diagrammatic axonometric top view of a second embodiment of the container in flexible material, according to the invention;

Figure 13
is a partial axonometric bottom view of the container in figure 12;

Figure 14
is a top plan view of the plate with the dispenser spout of the container in figure 12;

Figure 15
is a sectional view taken along the line E-E in figure 14;

Figure 16
is a bottom plan view of the base of the container in figure 12;

Figure 17
is a sectional view taken along the line F-F in figure 16;

Figure 18
is a vertical section view of the container in figure 12;

Figure 19
is a sectional view like the one in figure 18, showing the container which has been crushed after use;

Figure 20
is a diagrammatic vertical section showing several containers stacked on top of each other;

Figures 21, 22, 23 and 24
show in diagrammatic form subsequent phases during the production cycle of a container according to the invention.

A description is given first of the container shown in figures 1 to 11, which is particularly suitable for vacuum-packed products in powder form, such as groung coffee and the like.

Such container is shown as a whole with reference number 1 and is substantially parallelepiped-shaped.

It is made of flexible material, that is of film having a substance of up to 270 gr/mq, and can be single-or double-walled, the latter being preferred since, after filling, it provides a smooth outer wall which covers the roughness which forms on the inner wall after vacuum-packing the contents. The flexible material of the container 1 is shown as a whole with reference number 2 in the appended figures and substantially forms its peripheral skirt.

A cover plate 3 (see in detail figures 7, 8) and a base plate or bottom 4 (see in detail figures 9, 10) are applied in correspondence with the upper and lower faces of the container 1, conveniently by heat-welding. In the embodiment shown in the appended figures, the cover plate 3 comprises a perimetral frame 5, to which a lid 6 is associated, opening with a hinge at 7 and provided, for exam-

ple, with rapid snap closing 8. The lid 6 fits particularly into a rectangular border 9 which rises from the frame 5, determining a labyrinth 10 which gives excellent sealing during use.

The frame 5 bears an upper relief 11, which runs along the outside of the border, in correspondence with which the cover plate 3 is welded inside the flexible material 2, which obviously is heat-weldable on its inner side.

Of course, the flexible material 2 can be foreseen heat-weldable (heat-sealable) on the outer side also, and in this case the cover plate 3 can be applied to the outside of the material 2 also.

Inside the border 9, which the lid 6 fits into, a further continuous relief 12 is foreseen, to which a peel-off diaphragm 13 can be heat-welded, being provided with a gripping tab 14, which facilitates tearing it off when opening. The diaphragm 13, therefore, makes the container hermetic, keeping it vacuum-sealed up to the moment of use.

The base plate 4 can be a simple bottom which is applied inside or outside the lower face of the container 1, to make it rigid. However, according to the invention, such base plate is conveniently provided with an automatic volume compensator which allows flexible vacuum-packed containers 1 to be realized which all have the same outer size, regardless of the density of the product, which may vary greatly, as happens for example in the case of products in powder form, such as coffee, producing a variation in volume which would affect the outer dimensions of the container, or cause empty spaces inside it, after vacuum-packing.

As can be seen in detail in figures 9 to 11, the base plate 4 has at the bottom a perimetral relief 15 and a central circular relief 16, with an inner hole 17, along which the inner side of the flexible material 2 is heat-welded (heat-sealed), a hole 18 being made in the latter in perfect alignment with the hole 17 of the base plate 4.

As shown diagrammatically in figure 10, an impermeable flexible laminate diaphragm 20, previously heat-deformed into a concentric corrugated shape, is fixed above the base plate 4 by means of a raised perimetral border 19, opposite the said relief 15.

Between the flexible diaphragm 20 and the base plate 4, therefore, an expansion chamber 21 is formed, communicating with the outside by means of holes 17, 18, made respectively in the base plate 4 and in the flexible material 2 of the bottom of the container 1.

The corrugated shape of diaphragm or membrane 20 makes the material extremely flexible, without altering its continuity.

At the end of the vacuum-packing cycle, if empty spaces remain inside the container 1 due to the density of the powder matter inserted, the thrust generated by the difference in pressure, due to the air entering the expansion chamber 21 through the holes 17, 18, when the chamber where the container 1 is still under vacuum, deforms the membrane 20 into a cone, as shown diagrammatically in figure 11, in such a way that it thrust the product against the inner walls of the container 1, thus filling the above-mentioned empty spaces which might be left by the product.

In this way, the container 1 keeps its original dimensions, without any give in its shape which would cause obvious drawbacks.

The rigidity of the container 1 in flexible material 2 is given not only by the cover plate 3 and the base plate 4 but also by the particular folding of the flexible material 2, which determines folding edges, which are in a position such as to confer considerable rigidity to the container structure.

In particular, figure 1 illustrates in diagrammatic form a folding edge 22, positioned transversely to one of the container walls, for example the front one, then turning on the adjacent side walls, and two vertical folding edges 23, foreseen on the two opposite sides of the container 1, which may possibly be further folded back onto the front or back wall of the container (in case of squashed containers, this is to say containers with height inferior to the other dimension, the folding edges 23 could also be horizontal).

The transverse or horizontal folding edge 22 corresponds to the longitudinal fold of flexible material 2 during the shaping of the container, while the two vertical edges 23 correspond to transverse folds of the material, as will be seen in the illustration of the production method of the container according to the invention, with reference to figures 21 to 24.

Reference will now be made to figures 4 to 6, in which the folding edges 22 and 23 are illustrated in diagrammatic form, and to figures 3A, 3B, 3C, in which one end of a vertical folding edge 23 has been unfolded to show the triangle 24 turned towards the inside (see also figure 6).

In addition, preventive creases may possibly be foreseen along the vertical edges of the container 1, or at any rate heat deformations determining ribs on the vertical walls of the same, so as to stiffen the container further.

In this way, a container is obtained, which, although it is made of flexible material, has a high degree of rigidity. As previously shown, this is due to the two plates, respectively a cover plate 3 and a base plate 4, to the outlines of which the flexible material 2 is welded, to the horizontal folding edge 22, which rests onto the rigid base 4, to the triangles 24, which are caused by the shaping of the container, and to the possible creases in corre-

spondence with the vertical edges.

The container 1, formed in this way, maintains its three-dimensional shape even when it is no longer under vacuum and only partially full.

In the embodiment illustrated, in which the container 1 is particularly suitable for vacuum packing the products contained in it, the inner wall of the flexible material 2 is made of materials suitable for the purpose, already known in themselves.

The same container just described can, possibly with slight alterations, be used for sterilizable products, vacuum packed or not. In this case, the flexible material 2 will have to be resistent to temperature of 127°C, for example polypropylene mixtures, and the expansion chamber 21 can be useful for compensating the head space which is caused during the product filling phases (steam jet, etc.).

Referring now to the figures 12 to 20, a further embodiment of the container according to the present invention will be described, which is particularly suitable for containing liquid or even powdery products, which are not vacuum-packed.

This embodiment of the container according to the invention differs from the previous one only in the shape of the cover plate 3 and the base plate 4, which will have the same reference numbers already used for the embodiment according to figures 1 to 11, with the introduction of additional reference numbers only for parts which are substantially different.

As can be seen in the appended figures, the upper cover plate 3 has a central spout 25, provided for example with a screw top 26 and possibly a seal, which could again consist of a peel-off diaphragm 13, with a tear-off edge 14, positioned at the top of the spout 25, as shown in diagrammatic form in figures 12 and 15.

The dispenser spout 25 is foreseen on a raised wall 27 of the upper plate 3, in such a way that the plate is substantially convex on the outside.

The base plate 4 (see in detail figures 13 and 17) has, on the other hand, a concave shaped structure, so as to be capable of fitting into the upper plate 3 almost fixedly, making the containers perfectly stackable on each other, as shown in figure 20.

The base plate 4 or bottom, which fits into the upper plate 3, can have a further central appendix 28 with a tooth 29, which moves to fit into a corresponding seat 30 foreseen inside the dispenser spout 25, to hold the two plates 3 and 4 of the container 1 together, after the container has been crushed, and to reduce its volume after use, as shown in diagrammatic form in figure 19.

The structure of the container illustrated in the figures from 12 to 20 can be used also for non vacuum-packed powdery products as well as for liquid products, by foreseeing for example a cap with holes on the top, for the products to come out.

With particular reference to figures 21 to 24, a brief description now follows of the production method of the container in flexible material, with rigid consistency, according to the invention.

A flexible sheet material 2 is moved forward intermittently, on which areas are punched, in predetermined zones, where the cover plates 3 are to be inserted and, if necessary, areas where the base plates 4 must be inserted, which are fed by separated tanks and welded along their outlines in such a way as to obtain a single hermetic piece. Figure 21 shows such plates 3 and 4 diagrammatically with a broken line, while the longitudinal broken lines on the sheet material 2 show the horizontal edges of the container 1 after shaping. On the sheet material 2, at predetermined points, creases 31 may also possibly be made by means of a hot plate, which are positioned at the vertical edges of the container 1, to increase its rigidity.

The band of flexible material 2 is then sent to a spindle, which in the present case is rectangular in section, where first longitudinal welding is carried out in correspondence with the folding edge 22 (which becomes transverse or horizontal on the container when formed), as shown in diagrammatic form in figure 22.

A first transverse welding is then carried out in correspondence with one of the folds 23, which then takes up a vertical position on the container 1 when formed, and in correspondence with which a cut is made, as shown in diagrammatic form in figure 23.

In this way a parallelepiped is formed, open at the upper part and welded at the lower part, with the cover plate 3 and the base plate 4 applied on the opposite fronts. Such parallelepiped is filled with the product and possibly sent to the vacuum chamber, or for sterilization, whichever is the case, after which the second transverse welding is carried out in correspondence with the other folding line 23, as shown in figure 24.

The two edges 23 with the weldings are then folded back and glued with adhesive, forming the container 1, which is shown in an upright shape in figures 1 and 4, with a lid opening with a hinge, and in figure 12 with a dispenser spout.

In the case of "squashed" containers, the two transverse weldings in correspondence with the two folding edges 23 can be effected in orthogonal sense with respect to what shown in figs. 23 and 24, this is to say, in order for foldings 23 to be horizontal on the formed container.

It is also clear that the two folding edges 22, 23 can be placed, on the respective faces of the container, in positions different from the ones shown. Particularly, the horizontal folding edge 22 could be placed near the lower edge of the con-

tainer 1.

The container 1 according to the invention can be realized with a vast range of flexible materials, many of which are homogeneous with each other, making recycling extremely easy.

From what has been said, the advantages of the container 1 in flexible material according to the invention are obvious, when compared with traditional containers.

Claims

1. A parallelepiped-shaped container comprising an upper or cover plate (3), with means allowing the container to be emptied, a lower or base plate (4) and a peripheral skirt (2), characterized in that said skirt is made of packing flexible material consisting of single- or multilayer films having a substance of up to 270 gr/mq, folded so as to present an horizontal folding edge which concerns a vertical wall of the container (1), e.g. the front wall, and a portion of the two side walls adjacent to it, and two folding edges (23), which are located on the said opposed side walls of the container.

2. A container according to claim 1 characterized in that the said flexible material (2) is single or double-walled.

3. A container according to any one of the previous claims, characterized in that the said flexible material (2) is heat-weldable on the inner side at least, and possibly on the outer side also.

4. A container according to any one of the previous claims, characterized in that said folding edges (23) are horizontal.

5. A container according to any one of the claims from 1 to 4, characterized in that said folding edges (23) are vertical.

6. A container according to claim 5, in which the said vertical folding edges (23) are also folded back partially onto the front or back wall of the container (1).

7. A container according to any one of the previous claims, characterized in that in correspondence with each folding edge (23) two triangles (24) are formed, which are turned towards the inside or the outside.

8. A container according to any one of the previous claims, characterized in that it is provided with creases (31), with appropriate curve radiuses, at the vertical edges, to bear better the loads along the vertical axis of the container, or with heat deformations which will form ribs on the vertical walls of the container.

9. A container according to any one of the previous claims, characterized in that the said cover plate (3) comprises a lid (6), opening for example by means of a hinge with respect to a perimetral frame (5) heat-sealed to the flexible material (2).

10. A container according to claim 9, characterized in that the opening of the said frame (5), below the lid (6), is sealed by a peel-off diaphragm (13), provided with a gripping tab (14).

11. A container according to any one of the previous claims, characterized in that the inner layer of the said flexible material is realized with materials already known in themselves, such that they will enable the products contained in the container (1) to be vacuum-packed.

12. A container according to any one of the previous claims, characterized in that the said flexible material (2) is a heat-resistant material, at least up to 127°C, such as polypropylene mixtures, so that it can be sterilized.

13. A container according to any one of the previous claims, characterized in that the said plate (4) is provided with a volume compensator suitable for keeping the outer dimensions of the container (1) constant, regardless of any possible variations in the volume of the product contained in it, vacuum-packed and/or sterilized.

14. A container according to claim 13, characterized in that the said volume compensator consists of an impermeable flexible laminate membrane (20), previously heat deformed into a concentric corrugated shape, and fixed along the perimeter on the inside of the base plate (4), in such a way as to define an expansion chamber (21) communicating with the outside through a hole (17) foreseen in such plate and a corresponding hole (18) aligned with it, foreseen in the flexible material (2).

15. A container according to any one of the claims from 1 to 8, characterized in that the said cover plate (3) has a dispenser spout (25), closed for example by a screw top (26), and possibly having a seal, consisting for example of a peel-off diaphragm (13) with a gripping tab

(14).

16. A container according to claim 15, in which the said dispenser spout (25) is closed by a cap with several holes.

17. A container according to claim 15 or 16, characterized in that the said base plate (4) has a shape such that it fits into the cover plate (3), in such a way that it allows the containers (1) to be stacked on top of each other.

18. A container according to any one of the claims from 15 to 17, characterized in that inside the said base plate (4) and the cover plate (3) irreversible hooking means are foreseen, which allow such plates to be held joined together after the empty container has been axially crushed.

19. A container according to claim 18, characterized in that the said irreversible hooking means consist of a tooth (29) foreseen on an appendix (28) of the base plate (4), which fits fast into a corresponding seat (30) foreseen inside the spout (25) of the cover plate (3).

20. A container according to any one of the previous claims, characterized in that it is obtained from materials homogeneous with each other, in such a way that it can be recycled.

21. A method for the production of a container in flexible material, with the consistency of a rigid container, according to any one of the previous claims, comprising the following phases:
- punching, in predetermined zones, areas where the cover plates (3) must be inserted, and if necessary, areas where the base plates (4) must be inserted, on a band of flexible material (2) which is moved forward intermittently;
- inserting plates (3, 4) onto the said areas, said plates being fed from separate tanks, and welding the related outlines, so as to obtain one single hermetic piece;
- carrying out any possible creases (31) by means of a hot plate on predetermined points, in such a way that they are positioned in correspondence with the vertical edges of the container (1);
- sending the band of flexible material (2) to a rectangular section spindle, where initially longitudinal welding is carried out along the folding edge (22), then transverse welding with a subsequent cut along a folding edge (23), so as to determine a parallelepiped open at the top, which is subjected to another transverse welding along another folding edge (23) after filling.

22. A method according to claim 21, characterized in that between filling and the second transverse welding along a folding edge (23) the container is sent to a vacuum and/or sterilization chamber, where the said pressure compensator (20, 21) intervenes to eliminate empty spaces forming inside the container, in such a way as to keep its outer dimension constant.

23. A method according to claim 21 or 22, in which the said edges (23) obtained as a result of the two transverse weldings, are folded back and glued with a special adhesive onto the sides of the container (1).

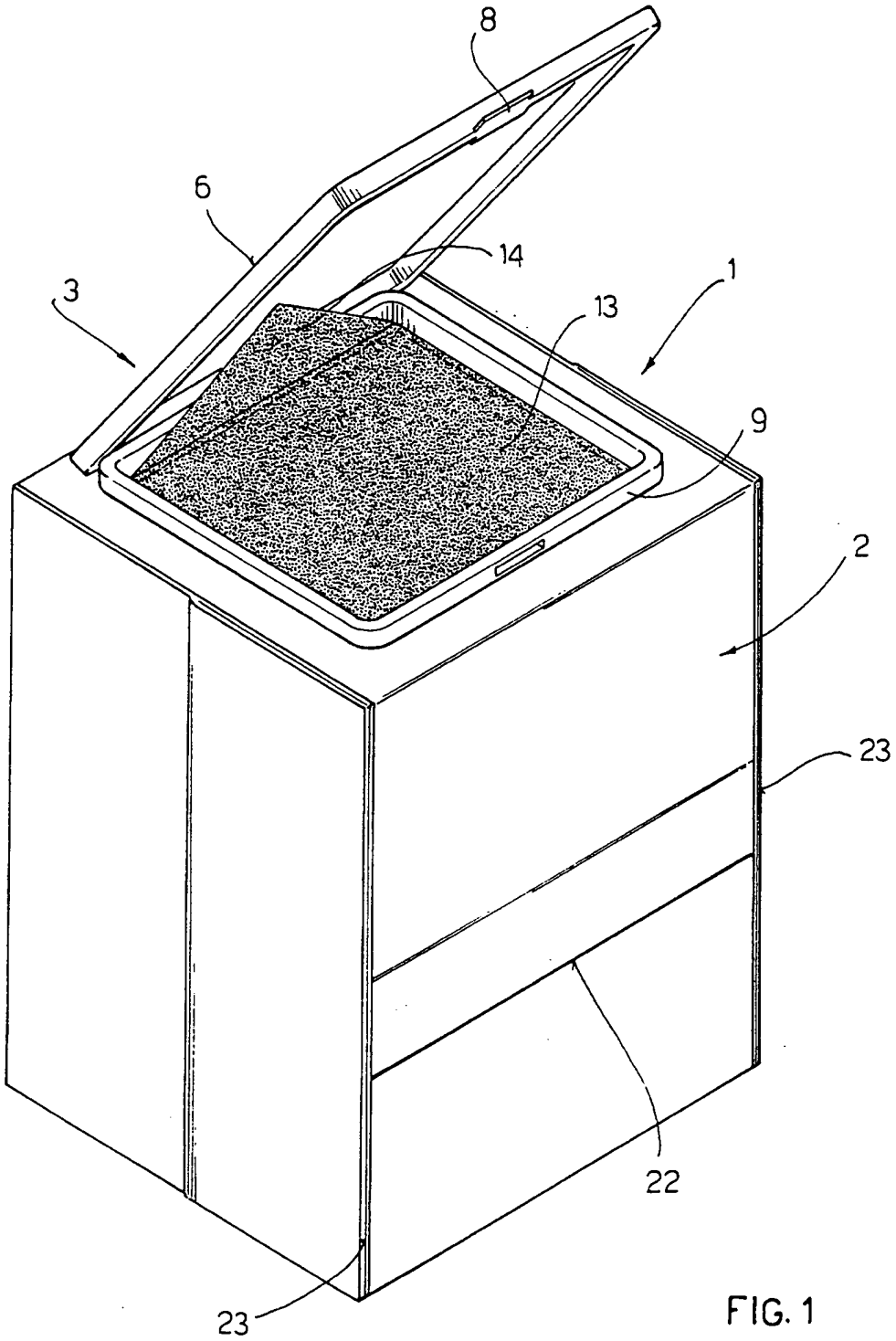
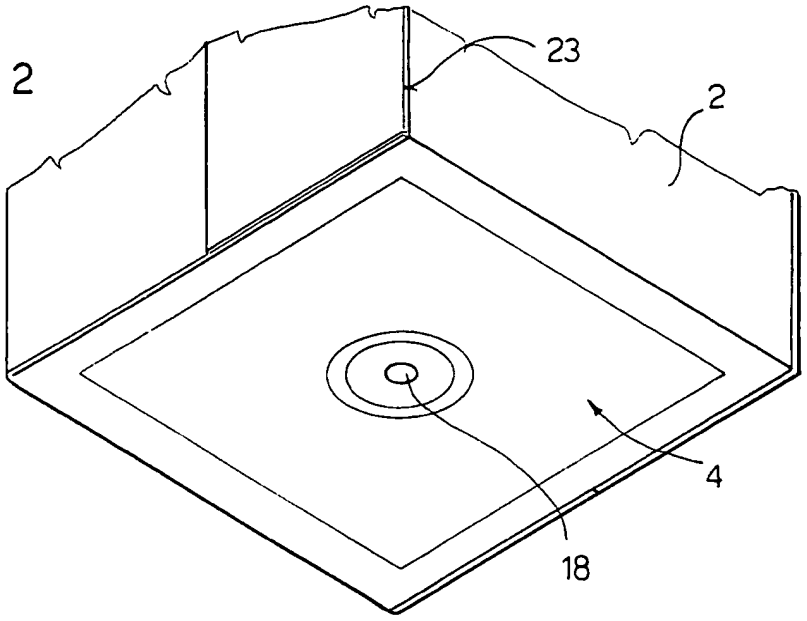


FIG. 1

FIG. 2



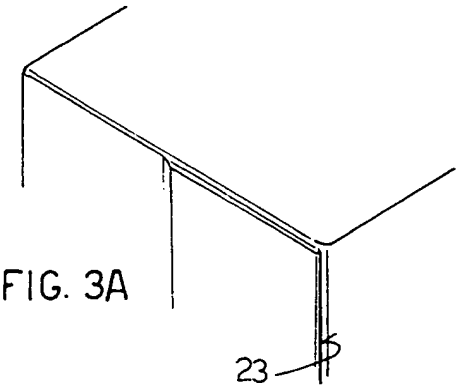
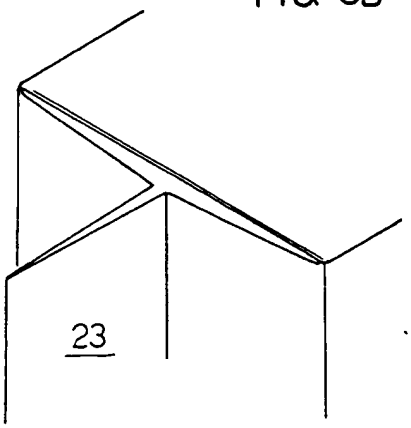


FIG. 3A

FIG. 3B



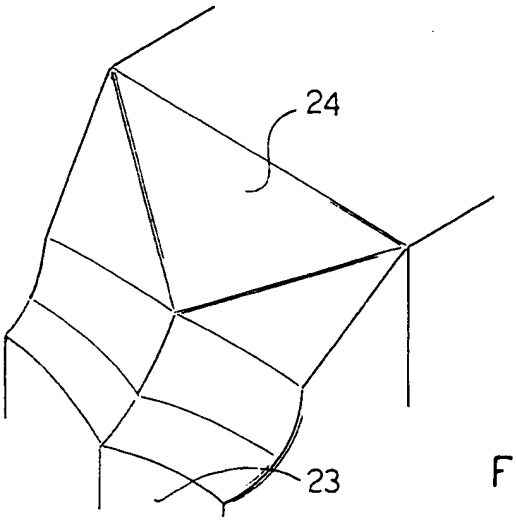


FIG. 3C

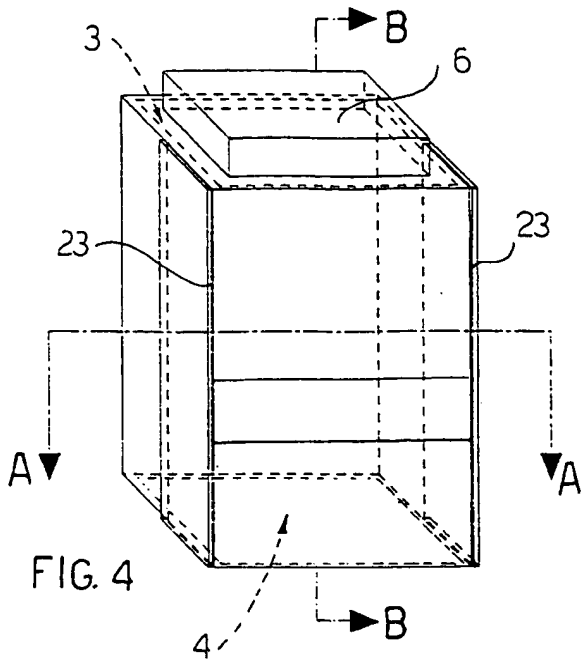


FIG. 4

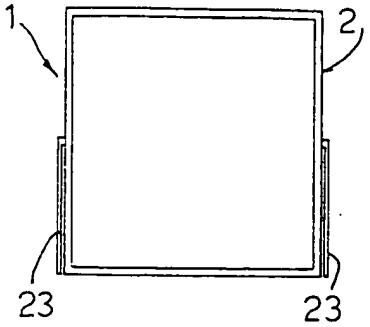


FIG. 5

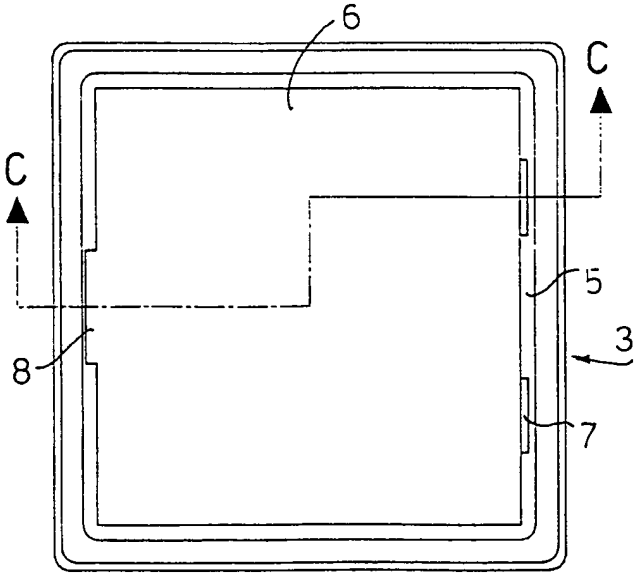


FIG. 7

FIG. 6

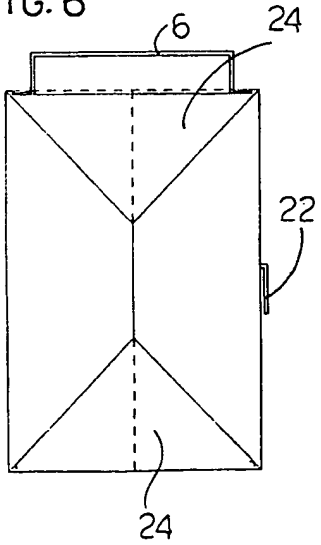
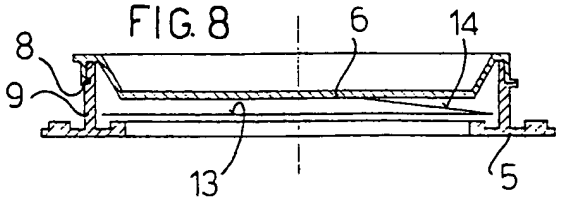


FIG. 8



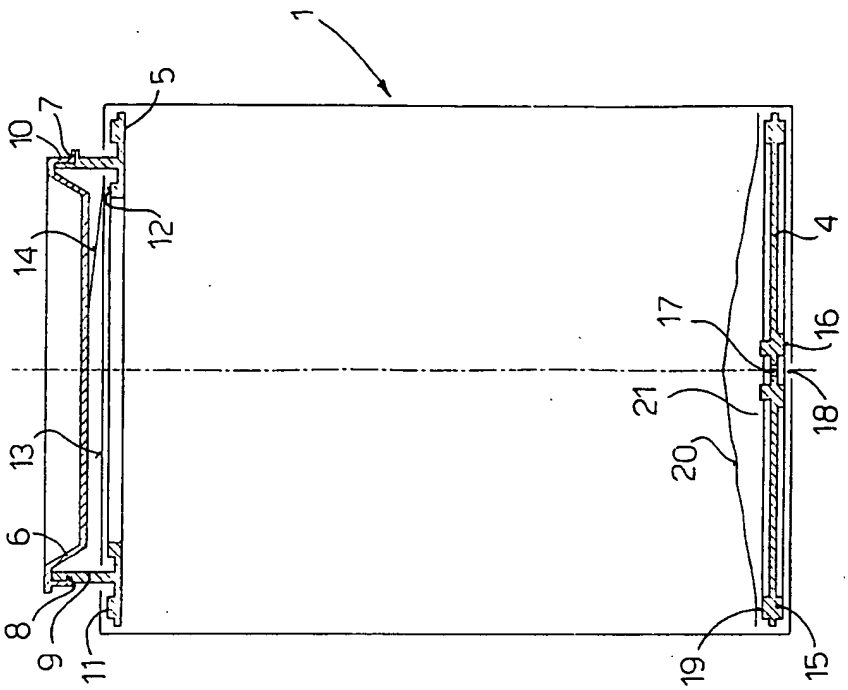


FIG. 11

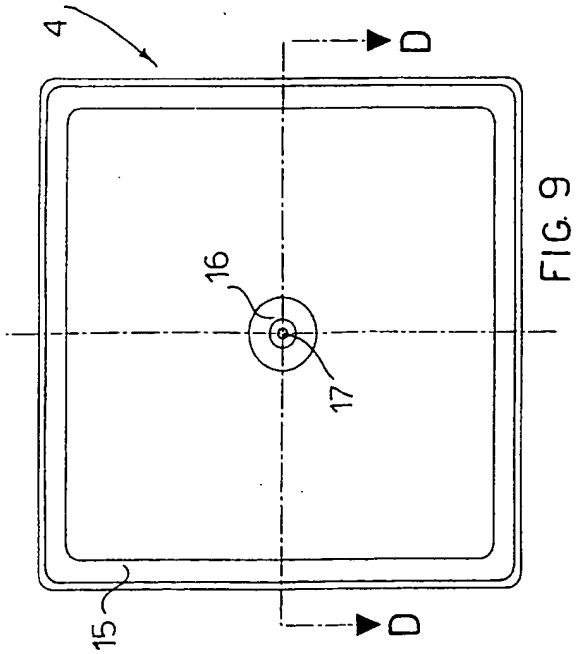


FIG. 9

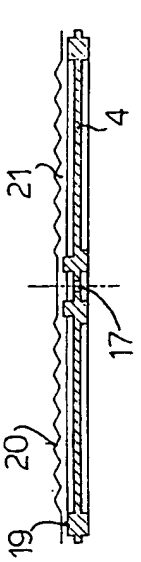


FIG. 10

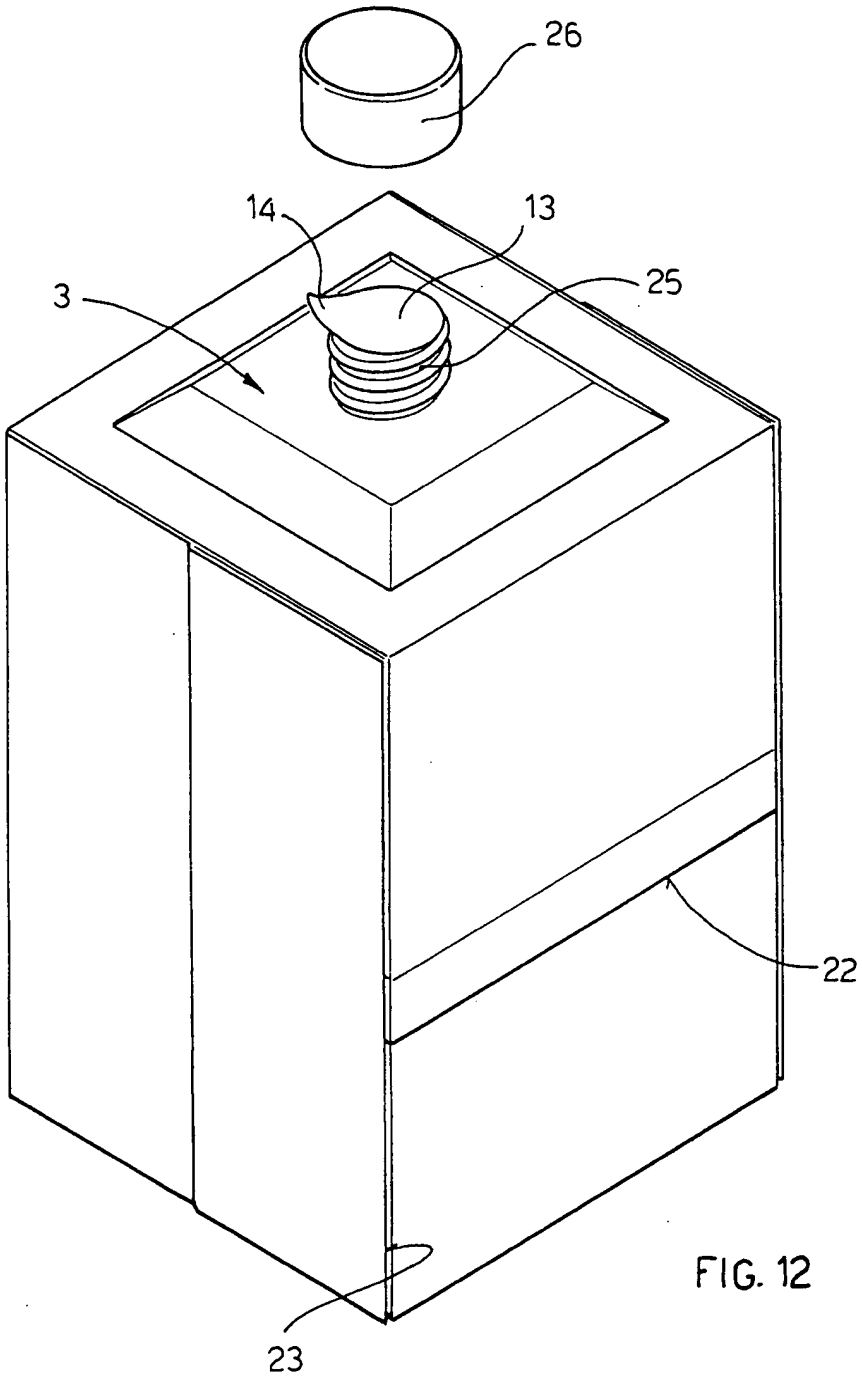


FIG. 12

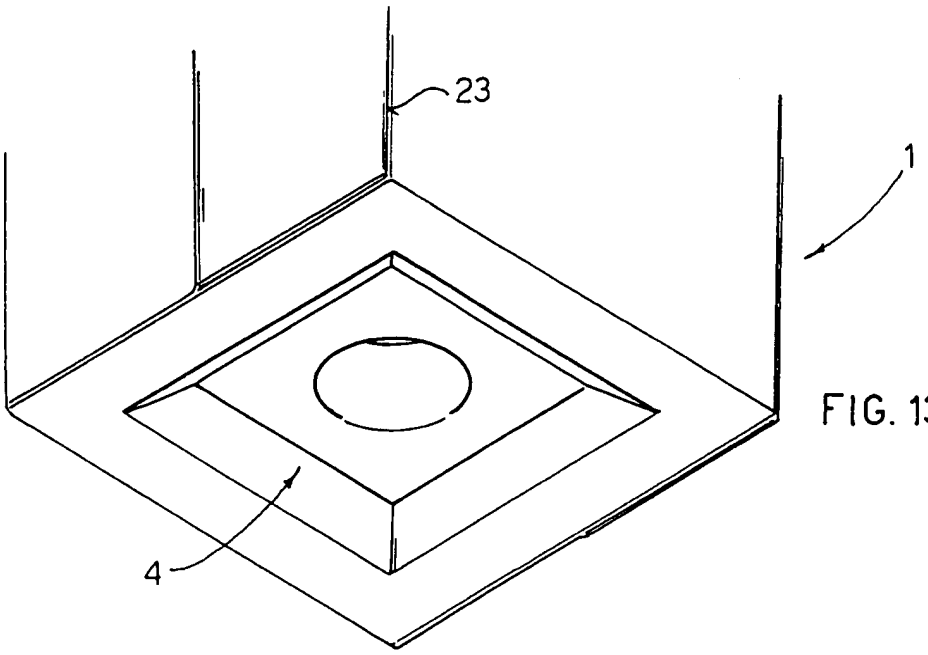


FIG. 13

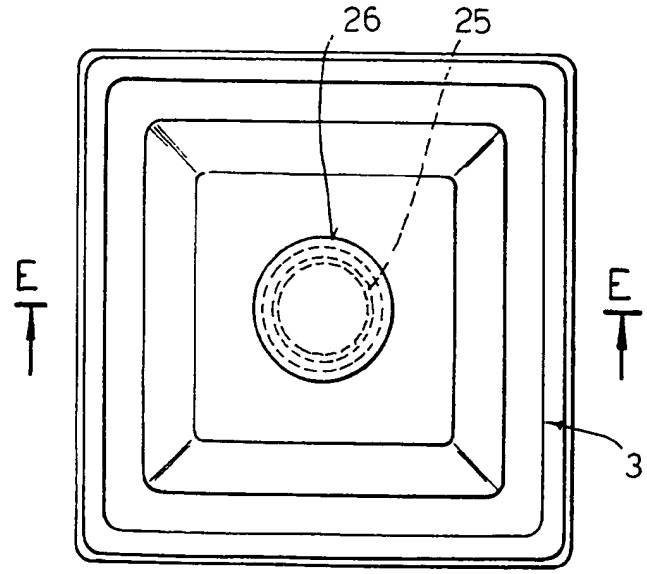


FIG. 14

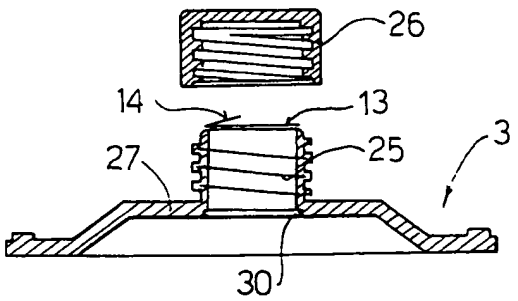


FIG. 15

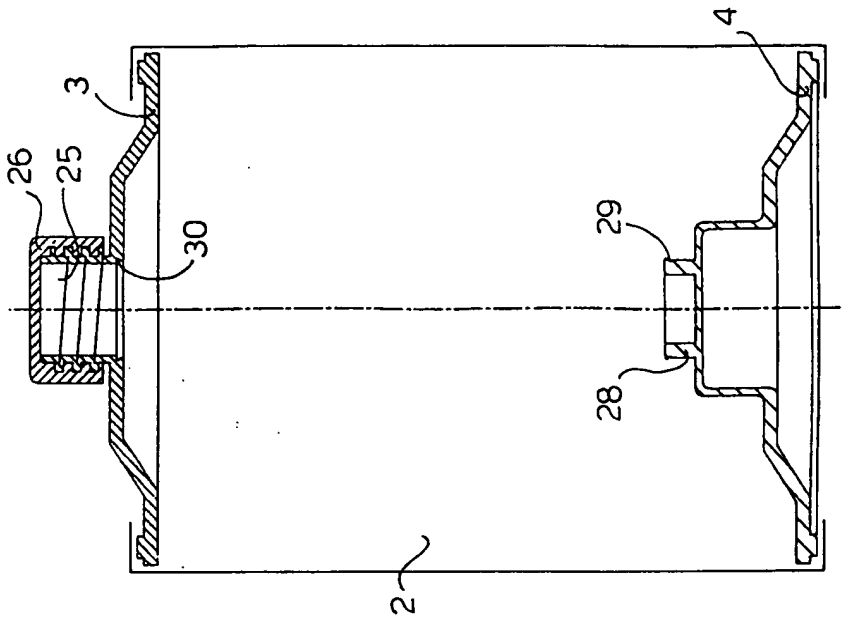


FIG. 18

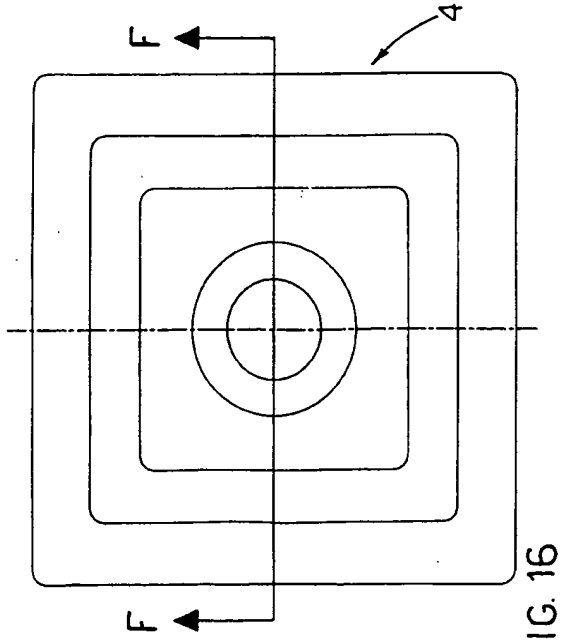


FIG. 16

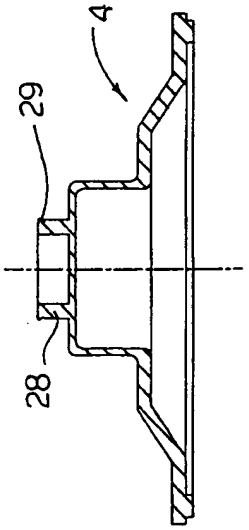


FIG. 17

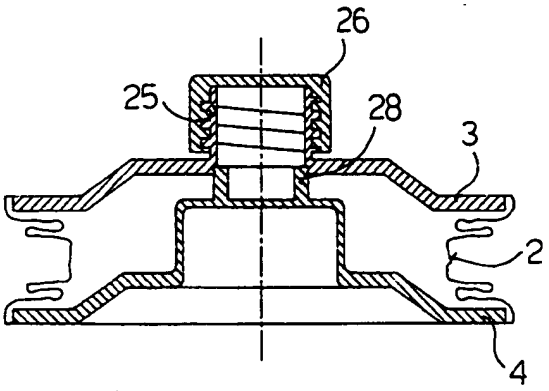


FIG. 19

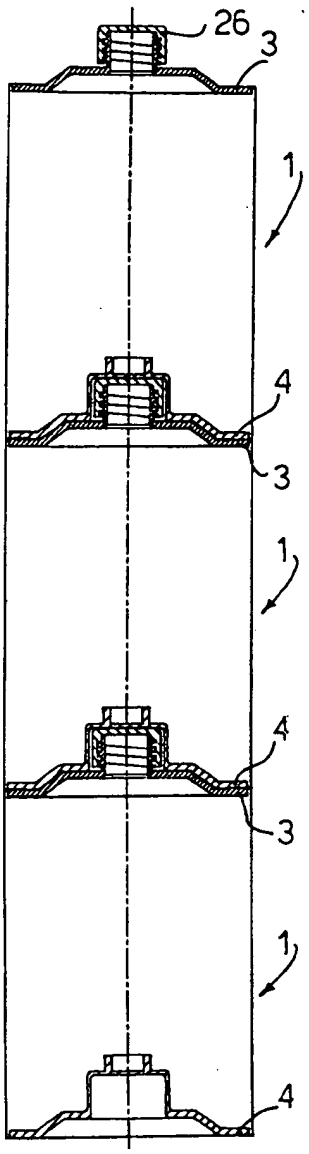


FIG. 20

FIG. 21

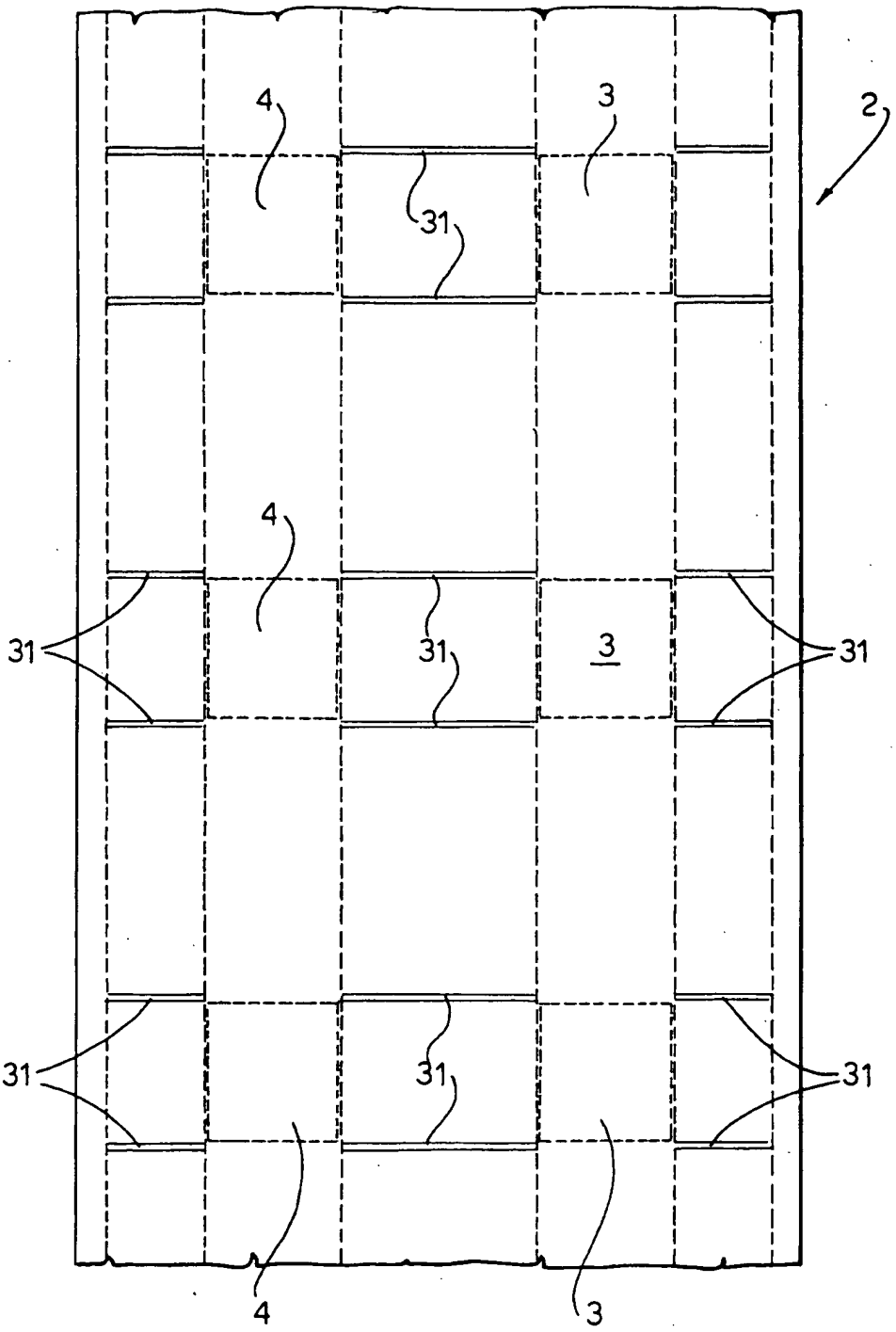
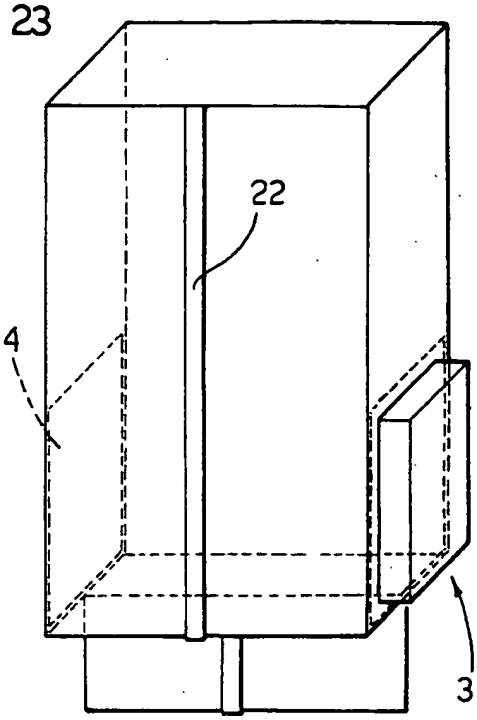


FIG. 23



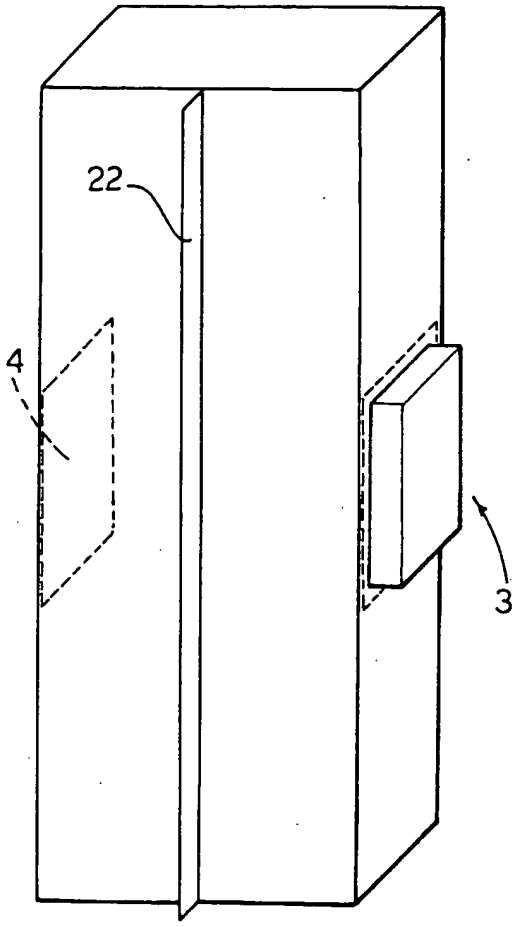


FIG. 22

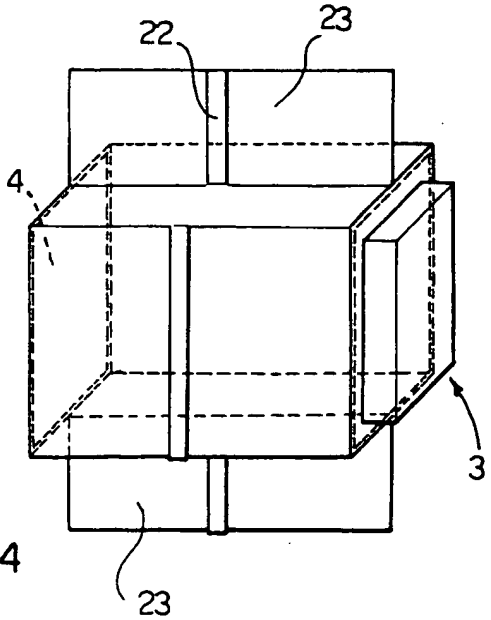


FIG. 24

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 92 11 0197

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A,D	CH-A-385 100 (HESSER MASCHINENFABRIK-AKTIENGESELSCHAFT) * figures *	1,21	B65D13/00 B65D21/02 B65D51/20 B31B17/00
A	GB-A-508 793 (H.MACLEAN WARE) * figures 1-3 *	1	
A	DE-A-3 541 010 (E.HEUBERGER) * abstract; figures *	1,21	
A	EP-A-0 401 546 (TETRA PACK) * abstract; figures *	1	
A	GB-A-376 550 (W.J.EVERSHED) * figures *	1	
A	US-A-3 826 359 (N.M.BRECHER) * abstract; figures *	1	
A	US-A-3 893 566 (R.T.ROSS) * abstract; figures *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B65D
B31B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29 OCTOBER 1992	AMEDEO ZANGHI

CATEGORY OF CITED DOCUMENTS

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